RUGGEDIZED MICROWAVE DUPLEXING TUBES
PRODUCTION ENGINEERING MEASURES PROGRAM

Fourth Quarterly Progress Report

12 December 1962 through 11 March 1963

Contract No. DA36-039-SC-85987

U. S. Army Signal Supply Agency
225 South 18th Street
Philadelphia 3, Pennsylvania

MICROWAVE
ASSOCIATES,
INC.

RUGGEDIZED MICROWAVE DUPLEXING TUBES
PRODUCTION ENGINEERING MEASURES PROGRAM

Fourth Quarterly Progress Report

12 December 1962 through 11 March 1963

Signal Corps Contract No. DA36-039-SC-85987

Order No. 19037-PP-62-81-81

Contracting Agency: U. S. Army Signal Supply Agency
225 South 18th Street
Philadelphia 3, Pennsylvania

MICROWAVE ASSOCIATES, INC.
Burlington, Massachusetts

RUGGEDIZED MICROWAVE DUPLEXING TUBES
PRODUCTION ENGINEERING MEASURES PROGRAM

Fourth Quarterly Progress Report

12 December 1962 through 11 March 1963

Object: Manufacture JAN 1B63A, 6164, 6334, and broadband X-band crystal protector TR to operate at 350°C.

Signal Corps Contract No. DA36-039-SC-85987

Order No. 19037-PP-62-81-81

Prepared by:

Paul Basken, Development Engineer

Approved by:

Norman J. Brown, Group Leader

MICROWAVE ASSOCIATES, INC.
Burlington, Massachusetts

TABLE OF CONTENTS

1. ABSTRACT

The manufacture and testing of forty preproduction samples, and the preparation of facilities, equipment, specifications, and personnel for preproduction approval have been the objective of this quarter of the program.

The overall yield was improved to 60%, and complete fabrication procedures and flow charts were prepared for use during the pilot run.

A composite 2000 hour life test was completed on two tubes, indicating that cleanup rates established on single temperature life tests might be valid for composite temperature life tests. The feasibility to use an accelerated 350°C life test to predict accurate life expectancy at lower temperatures is suggested.

2. PURPOSE

The purpose of the contract is to construct and establish capabilities to mass produce microwave duplexing tubes which shall operate satisfactorily under the environmental conditions specified in Table I, Group VII of Military Standard MIL-STD-446A, in addition to satisfying the respective tube type electrical and mechanical specification. The tube types involved in this contract are: JAN 1B63A, 6164, 6334 and a broadband X-band crystal protector TR.

3. NARRATIVE AND DATA

3.1 Introduction

The fourth quarter of the Production Engineering Measure - from December 12, 1962 to March 11, 1963 - was devoted primarily to the fabrication and testing of preproduction sample tubes.

Originally, the preproduction phase was to end by March 11, 1963. In a meeting held at Microwave Associates on December 17, 1962 with Mr. Stanley Sokolove, USASSA, and Mr. Edward DeCamp, USASRDL, the need for an extension of this phase was realized in order to perform all required testing, including a 2000 hour life test.

The revised schedule, as approved by the Contracting Officer, is as follows:

Preproduction Phase: December 12, 1962 to August 11, 1963

Pilot Run: August 11, 1963 to February 11, 1964.

Figures 1a and 1b present the overall program plan and reflect the revised schedules.

A TAR with preliminary tube specifications was submitted for approval to the Contracting Agency in January.

3.2 Fabrication of Preproduction Samples

As for the second group of forty engineering samples, a total of one hundred tube starts were made for the forty preproduction samples. Again, a careful analysis was made of the shrinkage rates at the various stages of manufacture. In addition, detailed schedules and flow charts were developed for use during the manufacture of the pilot run.

The overall yield for the different tube types was very nearly the same, as can be seen from Tables I, II and III which represent the individual operational yields of each tube type. The fabrication yield, however, is lowest for the dual tube (66%) and highest for the JAN 6164 version (72%), whereas the test yield is reversed. Noteworthy is the exceptionally low shrinkage (only 10%) during the Final Operations which had claimed 20% of the engineering tubes.

The majority of tubes lost during fabrication could be reworked. In particular, the third brazing operation (window braze) was eventually completed successfully on all tubes after removal of the faulty windows. The final yield including reworks was slightly over 60%.

The electrical tests were performed in accordance with the preliminary test specifications. A summary of the test results will be presented in the next quarterly report, as the specifications to which the tubes were tested should be approved by that time.

3.3 Life Testing

During the last quarter, two tubes have completed two thousand hours of life, and six more were placed on life test at a later date.

As has been shown in the third quarterly report, the keep alive discharge limits the life at 350°C to 200 hours due to gas cleanup. The tubes are capable, however, of extended life at lower temperatures. It was indicated in that report, that the effect of 200 hours at 350°C can be equated to a longer period of life time at lower temperatures. Indeed, the life tests performed to that time indicated that the tubes cleaned up the same amount in 200 hours at 350°C as in 1000 hours at

250°C or 2500 hours at 125°C.

Figure 2 is a graph of the average cleanup rate as a function of temperature. From this graph it is possible to predict the life expectancy at any one temperature, but it is not possible to calculate the life expectancy of a tube operated at various temperatures, unless the instantaneous cleanup rate is also known. This rate could be determined by two methods: first, by actually measuring the gas density, and second through the performance of a series of life tests during which the temperature was varied. The composite cleanup rates could then be mathematically "fitted" to individual cleanup curves.

The life test proposed in the tentative specification is of a composite nature as follows:

$T = 25°C$ for 750 hours

$T = 125°C$ for 750 hours

$T = 200°C$ for 350 hours

$T = 350°C$ for 150 hours

If the average cleanup rate of Fig. 2 were identical to the instantaneous rate, tube cleanup would be anticipated after about 1900 hours, as is shown in Fig. 3. The cleanup of interest here is that of the output section only where the action of the keep alive discharge sets the limitation. The gas fill in this section is adjusted for maximum life with crystal protection, and failure due to cleanup can show up in two ways: recovery time increase due to depletion of the active gases only or keep alive irregularity and crystal burnout due to a decrease of the total gas density below a critical value.

Of the two tubes which completed the two thousand hour composite life test, only one lasted the entire period, although toward the end it showed signs of severe gas cleanup. Table IV presents the life history of this tube. Only one crystal was exposed to the tube during the entire test, suffering a total degradation of 1.5 db in noise figure. The recovery time remained nearly the same during the test, indicating very little cleanup of the input section and also a relatively constant cleanup of all the gases in the output section. This is expected, as the tube wall conditioning process suppresses greatly the chemical reaction of the active gas constituents with the metal surfaces. Leakage power is nearly constant for the first 1900 hours, but then increases rapidly due to the advanced cleanup of the output section.

The second life test tube - summarized in Table V - showed the same behavior for 1900 hours, but failed at 1988 hours, merely 12 hours short of the 2000 hour goal. The failure was shown to be caused by a nearly complete cleanup of the output section.

The results obtained from these two life test tubes indicate that the proposed 2000 hour composite life is more severe than the 200 hour test at 350°C. The indication is that the instantaneous cleanup rate is indeed very close to the average rate. If this is the case - and the six remaining life tests should confirm this - the composite life expectancy is only slightly above 1900 hours (from Figure 3). It would also follow, however, that the 200 hour life test at 350°C alone could accurately define the life capabilities of the tubes, and could be used as an accelerated life test sufficient to predict tube performance.

4. CONCLUSIONS

The fabrication of preproduction sample tubes has been completed successfully. As it has been found with the forty engineering samples, the shrinkage rates of the four tube types was fairly constant. Complete sets of fabrication procedures and flow charts have been made as a preparation for the pilot run.

The tubes fabricated conform in all respects to the tentative product specifications described in the third quarterly report.

A composite 2000 hour life test per tentative product specifications on two tubes indicated that the cleanup rates of tubes operated at only one temperature might be used to predict composite cleanup rates. More information is needed, however, to confirm the results obtained so far. Six additional tubes are life tested at this time. If the theory advanced in this report holds, it would be possible to replace the composite life test with an accelerated life test at 350°C only.

5. PROGRAM FOR NEXT INTERVAL

During the fifth quarter, the following will be performed:

1. Completion of six life tests.
2. Submission of a request to finalize a set of product specifications based on all information obtained.
3. Testing of preproduction tubes as directed by the testing activity (USASIMSA).
4. Completion of manufacturing drawings.

6. PUBLICATIONS AND REPORTS

No publications connected with the contract were made during the interval covered by this report.

7. IDENTIFICATION OF PERSONNEL

Name	Title	Hours Worked
Norman Brown	Group Leader	12
Paul Basken	Development Engineer	90
Roland Cayer	Development Engineer	20
Bernard Corcoran	Engineering Assistant	130
William Anderson	Engineering Assistant	80
Edward Wallace	Model Shop Supervisor	120

8. LIST OF TABLES AND ILLUSTRATIONS

TABLE I

MA 3172 (JAN 1B63A) and MA 3175 (Crystal Protector)

Manufacturing Yield

50 Starts

Preproduction Run

Operation	Tubes Lost		Yield - %	
First Braze	1		98.0	
Second Braze	2	(1)*	96.2	
Third Braze	5	(5)*	89.5	
Wall Treatment	3		93.1	
Exhaust	1		97.5	
Tuning (mechanical fault)	4		89.7	
Fabrication		16		68.0
Electrical Test (low level)	2		94.2	
Electrical Test (high level)	3		90.8	
Testing		5		85.5
Short Tipping	0		100	
Keep Alive & Exhaust Capping	0		100	
Grinding & Plating	0		100	
Mechanical Inspection	2		93.2	
Final Operations		2		93.2
Overall (no reworks)	23		54	
Overall (including reworks)	19		62	

()* denotes tube reworked

TABLE II

MA 3173 (JAN 6334) Manufacturing Yield

25 Starts

Preproduction Ru

Operation	Tubes Lost		Yield - %	
First Braze	0		100	
Second Braze	2		92.3	
Third Braze	4 (4)*		82.8	
Wall Treatment	2		89.5	
Exhaust	0		100	
Tuning (mechanical fault)	1		94.2	
Fabrication		9		66.0
Electrical Test (low level)	0		100	
Electrical Test (high level)	1		93.9	
Testing		1		93.9
Short Tipping	1		93.6	
Keep Alive & Exhaust Capping	0		100	
Grinding & Plating	0		100	
Mechanical Inspection	1		93.0	
Final Operation		2		87.2
Overall (no reworks)	12		52	
Overall (including reworks)	10		60	

()* denotes tubes reworked

TABLE III

MA 3174 (JAN 6164) Manufacturing Yield

25 Starts

Preproduction Run

Operation	Tubes Lost		Yield - %	
First Braze	1		96.0	
Second Braze	1 (1)*		95.8	
Third Braze	3 (3)*		87.2	
Wall Treatment	1		95.2	
Exhaust	0		100	
Tuning (mechanical fault)	1		94.9	
Fabrication		7		72.2
Electrical Test (low level)	2		89.0	
Electrical Test (high level)	1		93.8	
Testing		3		83.4
Short Tipping	1		93.6	
Keep Alive & Exhaust Capping	0		100	
Grinding & Plating	0		100	
Mechanical Inspection	1		93.0	
Final Operation		2		87.2
Overall Yield (no reworks)	12		52	
Overall Yield (including reworks)	10		60	

()* denotes tubes reworked

☐ ENG.
☐ GOV'T

MICROWAVE ASSOCIATES INCORPORATED

TUBE TYPE MA 3172(1B63A)

LIFE TEST DATA TABLE IV

SERIAL NO. 44

PRODUCTION DATE ______ GOVERNING SPEC. ______

LIFE TEST CONDITIONS: F=9000mc, tp=1.0µs, Ebb=-1000Vdc, t1=750 Hrs @ 25°C, t3=350 Hrs @ 200°C
po=200kw, prr=1000pps, Ri=4.7 megohms. t2=750 Hrs @ 125°C, t4=150 Hrs @ 350°C

SPECIAL DATA:		TEST	RT(1) µs	RT(2) µs	PF(1) mw	PF(2) mw	Ws(1) ergs	Ws(2) ergs	Li db			N.F db	CRYSTAL DATA			
		MAX	20	20	125	175	0.40	0.80	1.0			2.0	1N23E			
		MIN	-	-	-	-	-	-	-			-				
DATE	CLOCK	TIME											HOURS	NR	LC	NF
						At	t1=25°C									
12-21-62	2595	0	3.4	-	90	-	0.22	-	0.60			-	0	1.25	4.1	6.30
12-29-62	2786	191	3.0	-	56	-	0.22	-	-			0.0	191	1.21	4.2	6.30
1-2-63	2880	285	2.8	-	54	-	0.16	-	-			+.10	285	1.30	4.0	6.40
1-10-63	3072	477	2.8	-	60	-	0.16	-	-			+.10	477	1.29	4.1	6.40
1-17-63	3244	649	3.0	-	52	-	0.16	-	-			-.40	649	1.21	3.8	5.90
[illegible]	3359	764	3.0	-	50	-	0.17	-	0.80			-.30	764	1.24	3.8	6.00
						At	t2=125°C									
1-22-63	3359	764/0	3.0	3.0	50	103	0.17	0.30	0.80			-.30	764	1.24	3.8	6.00
1-28-63	3483	928/164	3.0	3.0	52	114	0.21	0.32	-			-.10	928	1.21	4.1	6.20
2-8-63	3720	1165/401	2.5	2.3	70	110	0.12	0.26	1.0			+.30	1165	1.40	4.1	6.60

THIS IS TO CERTIFY THAT THIS TEST WAS PERFORMED ACCORDING TO THE GOVERNING SPECIFICATION AND HAS PASSED ALL REQUIREMENTS.

SIGNED ______ APPROVED ______

☐ ENG.
☐ GOV'T

TUBE TYPE MA 3172(1363)

MICROWAVE ASSOCIATES INCORPORATED

LIFE TEST DATA **TABLE IV cont.**

SERIAL NO. 44

PRODUCTION DATE ______ GOVERNING SPEC. ______

LIFE TEST CONDITIONS: **See Page 1**

SPECIAL DATA:	TEST	RT(1) μs	RT(2) μs	PF(1) mw	PF(2) mw	Ws(1) ergs	Ws(2) ergs	Li db			ΔN.F. db	CRYSTAL DATA			
	MAX	20	20	125	175	0.40	0.80	1.0			2.0	1N23E			
	MIN	-	-	-	-	-	-	-			-				

DATE	CLOCK	TIME	RT(1)	RT(2)	PF(1)	PF(2)	Ws(1)	Ws(2)	Li			ΔN.F.	HOURS	NR	LC	NF
						At t_2=+125°C (continued)										
2-22-63	4055	1500/736	2.5	[illegible]	0	100	0.36	0.40	0.7			+.75	1500	1.45	4.4	7.05
						At t_3=+200°C										
2-22-63	4055	1500/0	2.5	[illegible]	40	100	0.36	0.40	0.7			+.75	1500	1.45	4.4	7.05
3-5-63	4209	1666/166	2.5	2.3	40	90	0.30	0.75	0.7			+.65	1666	1.40	4.4	6.95
3-3-63	4330	1727/227	[illegible]	3.5	60	100	0.32	0.60				+1.10	1727	1.60	4.4	7.40
3-13-63	4448	1845/345	2.3	4.0	40	100	0.48	0.60	0.7			+1.10	1845	1.60	4.4	7.40
						At t_4 = +350°C										
3-13-63	4448	1845/0	2.3	4.0	40	100	0.48	0.60	0.7			+1.10	1845	1.60	4.4	7.40
3-18-63	4567	1964/119	2.6	3.8	100	300	0.62	0.60	0.9			+1.20	1964	1.5	4.6	7.50
3-20-63	4609	2006/161	3.0	6.2	110	300	0.60	0.80	0.95			+1.50	2006	1.7	4.6	7.80

THIS IS TO CERTIFY THAT THIS TEST WAS PERFORMED ACCORDING TO THE GOVERNING SPECIFICATION AND HAS PASSED ALL REQUIREMENTS.

SIGNED ______ APPROVED ______

TUBE TYPE MA 3174(6164) MICROWAVE ASSOCIATES INCORPORATED

Page 1 of 2

☐ ENG.
☐ GOV'T

SERIAL NO. 21

LIFE TEST DATA TABLE V

PRODUCTION DATE ________ GOVERNING SPEC. ________

LIFE TEST CONDITIONS: F=9050, tp=1.0µs, Ebb=-1000Vdc, t1=750 Hrs @ 25°C, t3=350 Hrs @ 200°C
t2=750 Hrs @ 125°C, t4=150 Hrs @ 350°C

SPECIAL DATA:		TEST	RT(1) µs	RT(2) µs	PF(1) mw	PF(2) mw	Ws(1) ergs	Ws(2) ergs	L1 db			ΔN.F. db	CRYSTAL DATA				
		MAX	20	20	100	125	0.40	0.80	1.2			2.0	1N23E				
		MIN	-	-	-	-	-	-	-			-					
DATE	CLOCK	TIME											HOURS	NR	LC	NF	
						At	t1=25°C										
12-21-62	2595	0	5.0	-	68	-	0.12	-	0.65			-	0	1.27	4.4	6.65	
12-29-62	2786	191	5.4	-	50	-	0.12	-	-			+.05	191	1.29	4.4	6.70	
1-2-63	2880	285	5.4	-	60	-	0.10	-	-			-.15	285	1.21	4.4	6.50	
1-10-63	3072	477	5.0	-	60	-	0.10	-	-			+.10	477	1.32	4.4	6.75	
1-17-63	3244	649	4.5	-	36	-	0.10	-	-			2.0 -	649 0	3.7 1.3	9.0 4.4	10.0 6.70	* R'pld Xtal
1-22-63	3359	764	4.8	-	28	-	0.14	-	0.65			-.15	764 115	1.39	4.0	6.55	
						At	t2=+125°C										
1-22-63	3359	764/0	4.6	4.3	28	85	0.14	0.25	0.65			-.15	764 115	1.39	4.0	6.55	
1-28-63	3483	928/164	4.6	4.3	36	80	0.12	0.22	-			+.50	928 279	1.50	4.4	7.20	
2-8-63	3720	1165/401	4.0	4.0	50	135	0.12	0.24	0.60			+.50	1165 401	1.50	4.4	7.20	

THIS IS TO CERTIFY THAT THIS TEST WAS PERFORMED ACCORDING TO THE GOVERNING SPECIFICATION AND HAS PASSED ALL REQUIREMENTS.

SIGNED________ APPROVED________

*XTAL FAILURE DUE TO MISHANDLING

Pa 2 o

☐ [illegible]
☐ CONT

TYPE MA 317[illegible](6164) MICROWAVE [illegible] C[illegible]

LIFE TEST DATA TABLE V cont.

SERIAL NO. 21 PRODUCTION DATE [illegible] S[illegible]G SPEC.

LIFE TEST CONDITIONS: See Page 1

SPECIAL DATA:		TEST	RF(1) μA	RF(2) μA	PF(1) mW	PF(2) mW	Ws(1) ergs	Ws(2) ergs	Li db			N.F. db	CRYSTAL DATA 1N[illegible]3E			
		MAX	[illegible]	[illegible]	100	[illegible]	[illegible]	[illegible]	1			[illegible]				
		MIN					-	-	-							
DATE	CLOCK	TIME											HOURS	NR	LC	NF
						At	[illegible] + [illegible] ([illegible])									
-22	[illegible]055	1500/[illegible]	.	[illegible]	10[illegible]	3[illegible]	[illegible]	[illegible].0	[illegible].7[illegible]			+.[illegible]0	1500 730	1.5[illegible]	4.5	7.30
						At	t3 + [illegible]0°C									
[illegible]-63	4055	1500/0	[illegible]	2.5	100	[illegible]	0.[illegible]	[illegible].0	0.70			+.6[illegible]	1500 736	1.5[illegible]	4.5	7.30
[illegible]-5-63	[illegible]	[illegible]	[illegible]	[illegible]	70	[illegible]0	0.[illegible]5	0.25	[illegible]			+.70	1666 902	1.6[illegible]	4.4	7.40
[illegible]	4330	1727/227	[illegible]	5.0	70	76	0.19	0.2[illegible]	-			+.30	1727 963	1.50	4.7	7.50
3-13-63	4448	1845/345	2.2	4.0	62	72	0.0	0.24	0.65			+.90	1845 463	1.60	4.6	7.60
						At $t_4 = 350^{o}C$										
3-13-63	4448	1845/0	2.2	4.0	62	72	0.0	0.24	0.65			+.90	1845 463	1.60	4.6	7.6
3-18-63	4567	1964/119	2.4	2.6	80	100	0.30	0.40	0.70			+2.0	1964 582	1.9	5.2	8.7
3-19-63	4591	1988/143	2.5	3.2	80	100	0.30	0.20	0.70			DEAD	1988 606	-	-	-

THIS IS TO CERTIFY THAT THIS TEST WAS PERFORMED ACCORDING TO THE [illegible] SPECIFICATION AND HAS PASSED ALL REQUIREMENTS.

SIGNED ____________________ APPROVED ____________________

FIGURE Ia
REVISED PROGRAM PLAN

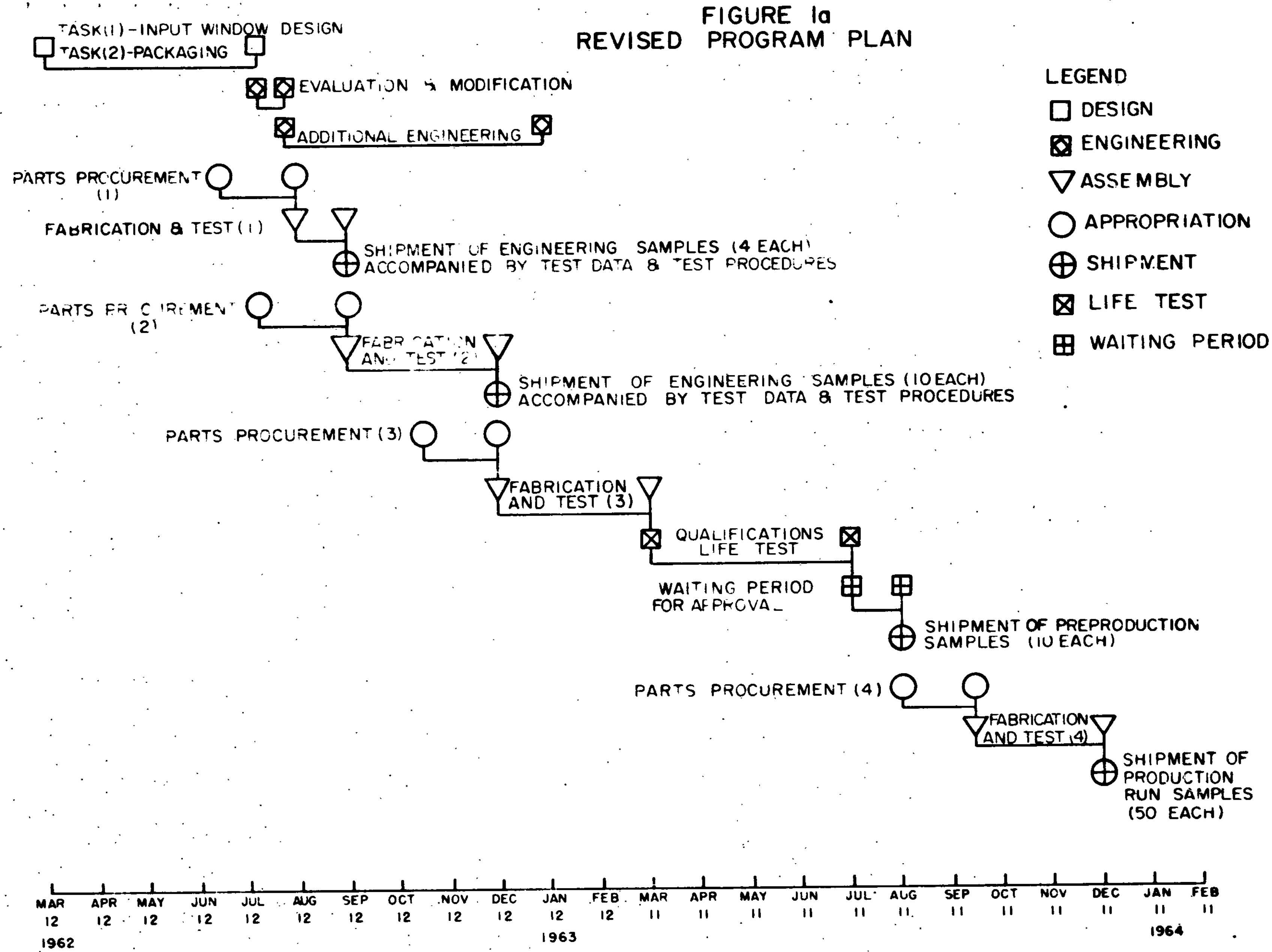


FIGURE Ib
REVISED MISCELLANEOUS REPORTS PROGRAM

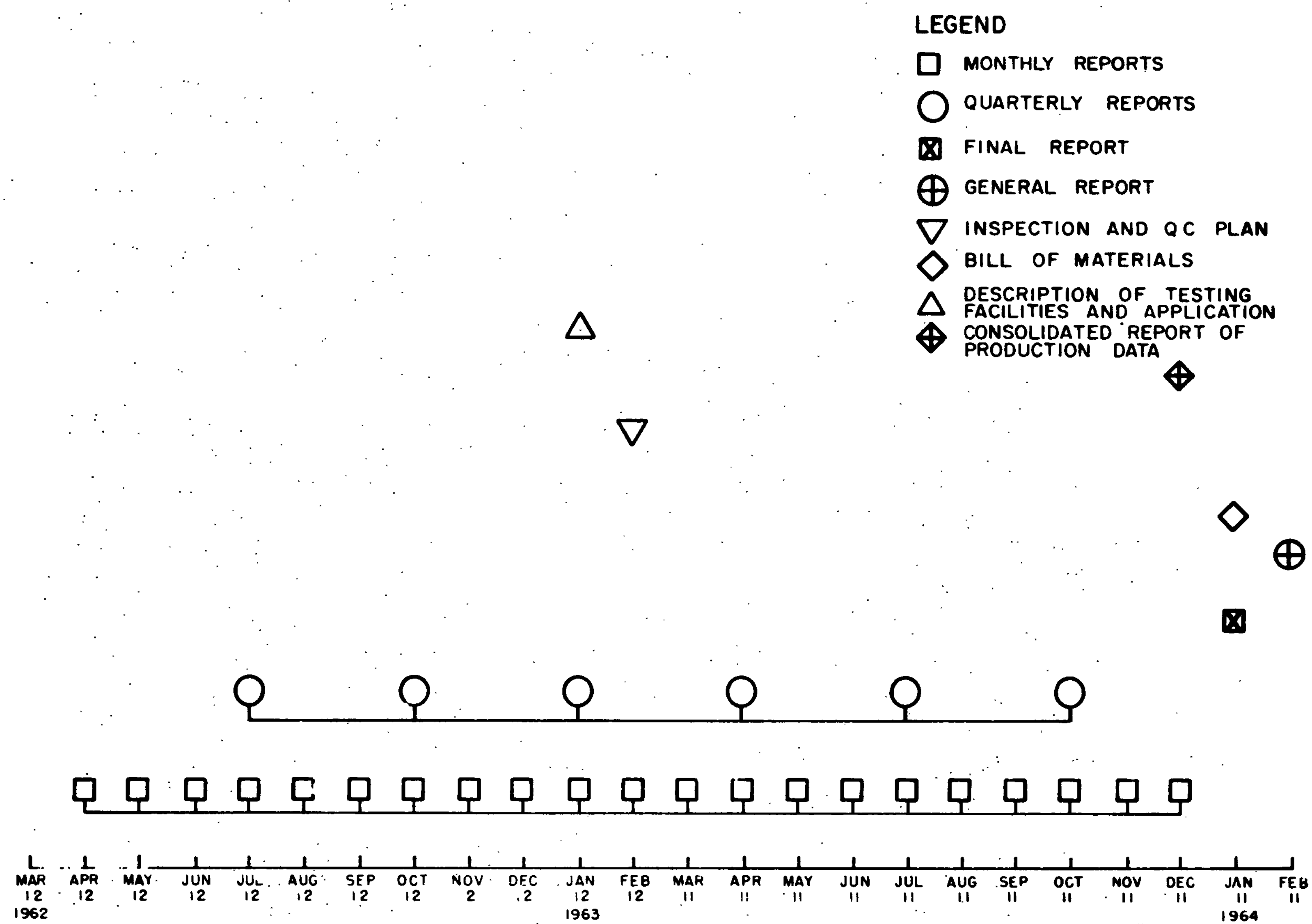
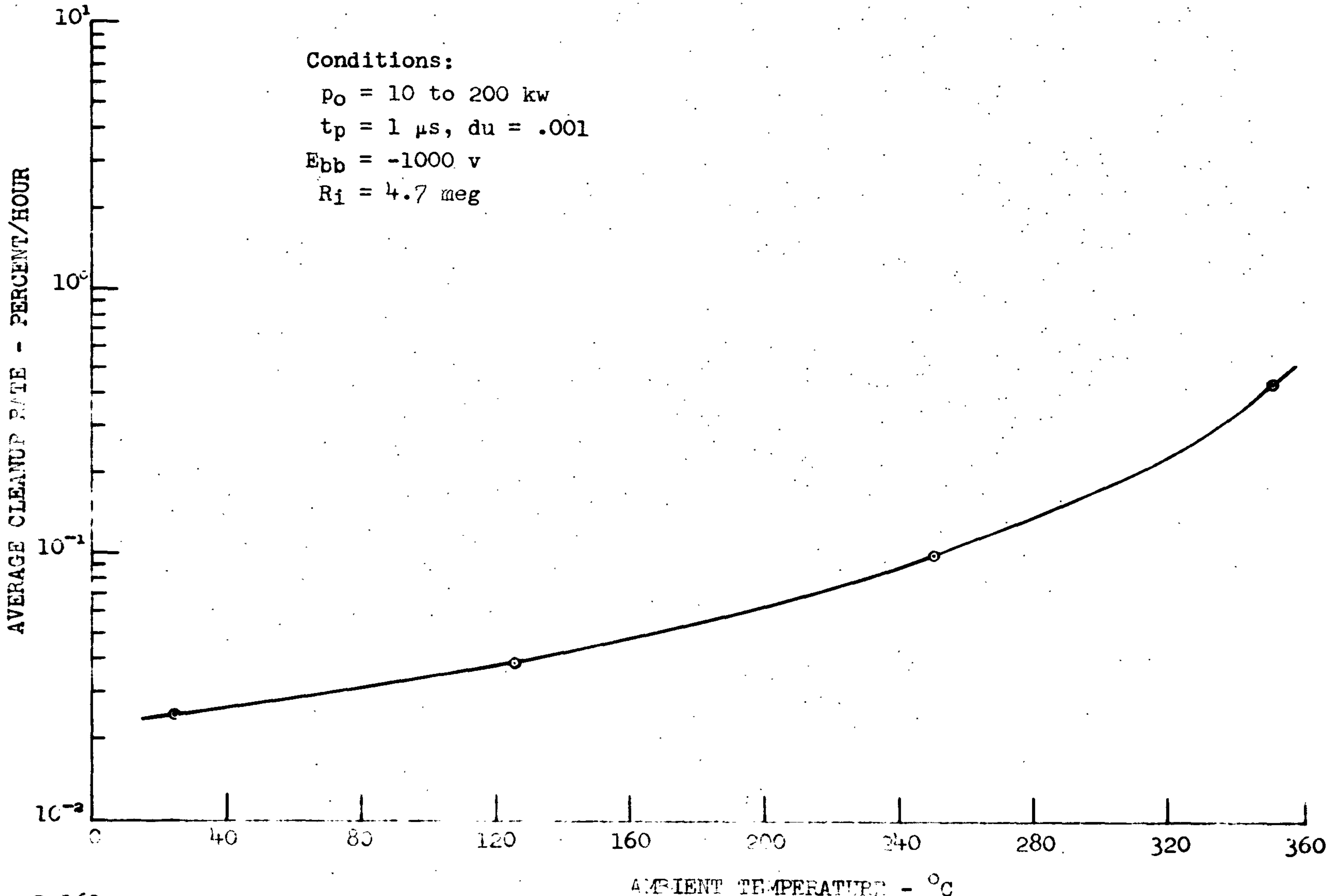


FIGURE 2

AVERAGE CLEANUP RATE vs. TEMPERATURE



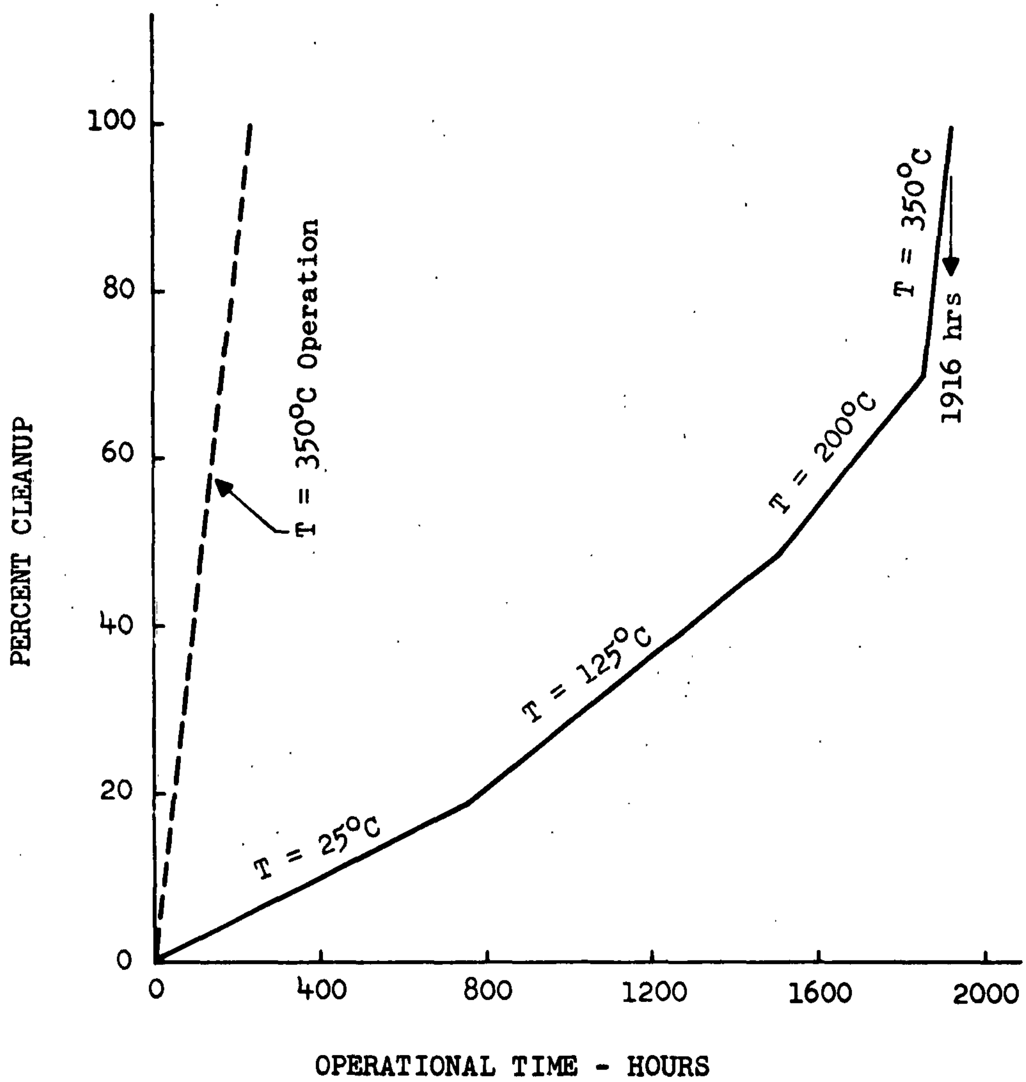


FIGURE 3

CLEANUP vs. OPERATIONAL TIME
FOR A COMPOSITE LIFE TEST

Conditions:

p_o = 10 to 200 kw

t_p = 1 μs, du = .001

E_{bb} = -1000 v, R_1 = 4.7 meg

AD________________ Accession No.________

MICROWAVE ASSOCIATES, INC.
Burlington, Massachusetts

RUGGEDIZED MICROWAVE DUPLEXING TUBES PRODUCTION ENGINEERING MEASURES PROGRAM

P. Basken

Fourth Quarterly Progress Report

18 pp. - Illus. - Graphs, Signal Corps Contract No. DA36-039-SC-85987

The manufacture and testing of forty preproduction samples, and the preparation of facilities, equipment, specifications, and personnel for preproduction approval have been the objective of this quarter of the program.

The overall yield was improved to 60%, and complete fabrication procedures and flow charts were prepared for use during the pilot run.

A composite 2000 hour life test was completed on two tubes, indicating that cleanup rates established on signle temperature life tests might be valid for composite temperature life tests. The feasibility to use an accelerated 350°C life test to predict accurate life expectancy at lower temperatures is suggested.

UNCLASSIFIED

1. Ruggedized Microwave Duplexing Tubes Production Engineering Measures Program

2. Contract No. DA36-039-SC-85987

AD________________ Accession No.________

MICROWAVE ASSOCIATES, INC.
Burlington, Massachusetts

RUGGEDIZED MICROWAVE DUPLEXING TUBES PRODUCTION ENGINEERING MEASURES PROGRAM

P. Basken

Fourth Quarterly Progress Report

18 pp. - Illus. - Graphs, Signal Corps Contract No. DA36-039-SC-85987

The manufacture and testing of forty preproduction samples, and the preparation of facilities, equipment, specifications, and personnel for preproduction approval have been the objective of this quarter of the program.

The overall yield was improved to 60%, and complete fabrication procedures and flow charts were prepared for use during the pilot run.

A composite 2000 hour life test was completed on two tubes, indicating that cleanup rates established on signle temperature life tests might be valid for composite temperature life tests. The feasibility to use an accelerated 350°C life test to predict accurate life expectancy at lower temperatures is suggested.

UNCLASSIFIED

1. Ruggedized Microwave Duplexing Tubes Production Engineering Measures Program

2. Contract No. DA36-039-SC-85987

AD________________ Accession No.________

MICROWAVE ASSOCIATES, INC.
Burlington, Massachusetts

RUGGEDIZED MICROWAVE DUPLEXING TUBES PRODUCTION ENGINEERING MEASURES PROGRAM

P. Basken

Fourth Quarterly Progress Report

18 pp. - Illus. - Graphs, Signal Corps Contract No. DA36-039-SC-85987

The manufacture and testing of forty preproduction samples, and the preparation of facilities, equipment, specifications, and personnel for preproduction approval have been the objective of this quarter of the program.

The overall yield was improved to 60%, and complete fabrication procedures and flow charts were prepared for use during the pilot run.

A composite 2000 hour life test was completed on two tubes, indicating that cleanup rates established on signle temperature life tests might be valid for composite temperature life tests. The feasibility to use an accelerated 350°C life test to predict accurate life expectancy at lower temperatures is suggested.

UNCLASSIFIED

1. Ruggedized Microwave Duplexing Tubes Production Engineering Measures Program

2. Contract No. DA36-039-SC-85987

AD________________ Accession No.________

MICROWAVE ASSOCIATES, INC.
Burlington, Massachusetts

RUGGEDIZED MICROWAVE DUPLEXING TUBES PRODUCTION ENGINEERING MEASURES PROGRAM

P. Basken

Fourth Quarterly Progress Report

18 pp. - Illus. - Graphs, Signal Corps Contract No. DA36-039-SC-85987

The manufacture and testing of forty preproduction samples, and the preparation of facilities, equipment, specifications, and personnel for preproduction approval have been the objective of this quarter of the program.

The overall yield was improved to 60%, and complete fabrication procedures and flow charts were prepared for use during the pilot run.

A composite 2000 hour life test was completed on two tubes, indicating that cleanup rates established on signle temperature life tests might be valid for composite temperature life tests. The feasibility to use an accelerated 350°C life test to predict accurate life expectancy at lower temperatures is suggested.

UNCLASSIFIED

1. Ruggedized Microwave Duplexing Tubes Production Engineering Measures Program

2. Contract No. DA36-039-SC-85987

Fourth Quarterly Report
Contract No. DA-36-039-SC-85987

DISTRIBUTION LIST

	No. of Copies
Armed Services Technical Information Agency Arlington Hall Station Arlington 12, Virginia Attn: TICSCA/42740	10
Advisory Group on Electronic Devices 346 Broadway - 8th Floor New York 13, New York	2
Commanding Officer U. S. Army Signal Research & Development Agency Fort Monmouth, New Jersey Attn: Mr. John Carter	2
Commanding General U. S. Army Signal Supply Agency 225 S. 18th Street Philadelphia 3, Pa. Attn: Chief, Quality Assurance Operation Division	1
Commanding Officer U. S. Army Signal Research & Development Agency Technical Information Division Fort Monmouth, New Jersey	1
METCOM, Inc. 76 Lafayette Street Salem, Massachusetts Attn: Duplexer Division	1
Bell Telephone Laboratory Murray Hill, New Jersey Attn: Mr. J. Wertz	1
Commanding Officer U.S. Army Signal Materiel Support Agency Fort Monmouth, New Jersey Attn: Mr. Simon Zucker	1

	No. of Copies
Bomac Laboratories, Inc. Salem Road Beverly, Massachusetts Attn: Duplexer Division	1
Canadian Liaison Office Office of the Chief Signal Officer Department of the Army The Pentagon Washington 25, D. C. Attn: SIGEO-CL	1
Commanding General U. S. Army Signal Supply Agency 225 S. 18th Street Philadelphia 3, Pa. Attn: SELMA-R2b	Balance of Copies
Arinic Research Corporation 1700 K Street, N.W. Washington 25, D. C. Attn: Mr. Robert Strauss	1